

ABSTRACT

Geometric parameters of the aspect ratio are determined for channels in a micro channel heat exchanger for gaseous fluids in which micro channels have a surface area density greater than $10000 \text{ m}^2/\text{m}^3$ in the alternate situations a) where volume is constant, and b) where volume is variable and the given aspect ratio is less than or equal to 10 or more than 10. The separate methodologies of computational fluid dynamics and an analytical approach are combined under given constraints such as pumping power and space limitations and the variables optimized are channel width, aspect ratio and spacing. Based on a specification for a heat exchanger, the optimal geometric parameters of a micro channel are obtained using plots of the performance curves of pressure loss in the channel for the hot side; pressure loss in the channel for the cold side; heat flux; and heat transfer rate against an axis corresponding to aspect ratio as a basis for a direct determination or further calculation. The optimized dimensions may be compromised to adapt to a defined manufacturing specification